

# Weekly Report

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*Period: 10/07/2013 – 10/13/2013*

## Projects

This week, I just reviewed the work accomplished by Xin Zhao. The user interface is almost done. However, I cannot see any accomplishments by Haonan. I will ask him to put more efforts on this project. In the next week, Xin will prepare a software registration document for discussion.

Besides that, the parallel visualization part does not get much progress as of this moment. So, we will have a discussion on this in the next Wednesday.

## Research

**DTI Research** By exporting the hash-based data structure [1], similar curves can be quickly queried for a given complex curve. Inspired by this observation, we had a discussion on how to employ this technique for DTI study. Generally speaking, two exploration tasks can be accelerated by this method: 3D selection and 3D comparison of fibers. However, a short detailed survey on this topic will be presented to verify the significance of these rough ideas. A potential application may be the interactive model correction for head motion. Difference discovering might be another application.

**Correlation Research** This week I spent a lot of time on CCA [2, 3] which is a prevailing technique to model two sets of random variables. The linear CCA methods require that the random variables follow a joint normal distribution. Thus, we have to resort to Kernel CCA for nonlinear dataset. For simplicity, we can use Kernel CCA to model the correlation of the variables at two different spatial grid points, and define a descriptor to characterize the local correlation structure for each spatial grid point. Nevertheless, this scheme is simple and quite straightforward. Deep thinking is required in the next several weeks for a solid motivation.

## Work to be done in next week

- ◆ Reading some papers on DTI fiber registration
- ◆ Propose a pipeline for the fiber comparison and difference visualization
- ◆ Investigate the uncertainty visualization work in this visualization conference

## Reference:

- [1] A “Semi-Lazy” Approach to Probabilistic Path Prediction in Dynamic Environments. 2013.
- [2] Canonical correlation analysis: An overview with application to learning methods. 2004.
- [3] Kernel Canonical Correlation Analysis and its Applications to Nonlinear Measures of Association and Test of Independence. 2006.